material, the positrons are rapidly "thermalized." That is, the positrons rapidly lose most of their kinetic energy by collisions with ions and free electrons present at or near the surface of the material. After being thermalized, the positrons then annihilate with electrons in the material. During the diffusion process, the positrons are repelled by positively charged nuclei, and thus tend to migrate toward defects such as dislocations in the lattice sites where the distance to positively charged nuclei is greater. In principle, positrons may be trapped at any type of lattice defect having an attractive electronic potential. Most such lattice defects are so-called "open volume" defects and include, without limitation, vacancies, vacancy clusters, vacancy-impurity complexes, dislocations, grain boundaries, voids, and interfaces.--

Please replace paragraph 0020 on page 7 with the following rewritten paragraph:

--As will be described in greater detail below, the method and apparatus of the present invention are suitable for use with materials or specimens 18 that will produce positrons in response to photon bombardment from the photon source 12. One way for producing positrons involves the decay of neutron-deficient isotopes. In the present invention, the photons 16 from the photon source 12 produce such neutron-deficient isotopes within the specimen 18 by removing or "knocking-off" neutrons from atoms within the specimen 18. The neutron-deficient isotopes (referred to herein in the alternative as "positron emitters") then decay into non-neutron-deficient atoms by the emission of positrons and neutrinos. Consequently, the bombardment of a material or specimen 18 containing certain isotopes amenable to the loss of neutrons by such photon bombardment will result in the formation of positrons within the material or specimen 18. This process is referred to herein as "photo-neutron activation" or, simply, "photon activation." Any material containing isotopes susceptible to such photon activation is suitable for use with the present invention.--

Please replace paragraph 0033 on page 13 with the following rewritten paragraph:

--Another significant advantage of the present invention is that it may be made specific to particular isotopes within the specimen. That is, by adjusting the energies of the photons 16 from the photon source 12, the photons 16 may be used to selectively activate one or more positron emitters within the specimen 18 while leaving other positron emitters un-activated. Moreover, compared with conventional positron annihilation analysis devices, the present invention may be made quite small and portable, thereby allowing the present invention to be readily and easily utilized in field settings to analyze materials and specimens in-situ. The present invention may also be used to monitor materials during production and/or processing, thereby allowing for the early detection of non-compliant materials and for the possibility of adjusting production parameters and processes to minimize the creation of non-compliant materials.--

In the Claims:

Please replace claim 1 with the following rewritten claim:

1. Non-destructive testing apparatus, comprising:

a photon source, said photon source producing photons having a predetermined energy and directing the photons toward a specimen being tested, the photons from said photon source resulting in the creation of positrons within the specimen being tested;

a detector, said detector positioned adjacent the specimen being tested so that said detector detects gamma rays produced by annihilation of positrons with electrons; and

a data processing system operatively associated with said detector, said data processing system producing output data indicative of a lattice characteristic of the specimen being tested.

Please cancel claim 6 without prejudice to the subject matter contained therein.

Please replace claim 7 with the following rewritten claim:

7. (Amended) The non-destructive testing apparatus of claim 1, wherein said data processing system is operatively associated with said photon source, said data processing system